USER INTERFACE FOR CHARACTER ENTRY USING A MINIMUM NUMBER OF SELECTION KEYS

CROSS REFERENCE

[0001] Priority is claimed from the following related, co-pending application, which is also hereby incorporated by reference for its teachings:

[0002] "USER INTERFACE FOR CHARACTER ENTRY USING A MINIMUM NUMBER OF SELECTION KEYS," Michael W. Murphy, application Ser. No. 10/050,201, filed Jan. 16, 2002, and published on Jul. 18, 2002 (US 2002/0093535A1).

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BACKGROUND AND SUMMARY OF THE INVENTION

[0004] Manual alphanumeric or symbolic data entry is commonly accomplished employing an array of keys representing characters comprising alphanumeric characters, a spacebar, and symbols that are manually activated by the user in selecting text, or otherwise entering data. In personal computers and workstations, such selections are translated by word processing or spreadsheet applications, for example, and displayed or printed as the text is composed or data is entered. The keys of a keyboard are typically depressed in a time sequence to formulate words from individual alphabet characters or to enter numeric values. An application can provide for special cases requiring simultaneous depression of two or more keys to format text or for other control features, i.e. a Shift key. However, in general the keyboard keys and associated characters are visually and tactually distinguished only by their physical, fixed position in the keyboard array.

[0005] Current Roman alphabet computer keyboards retain key size, spacing and alphanumeric character layout of earlier mechanical and electrical typewriters in large part to accommodate persons trained in usage of the QWERTY keyboards to perform long taught typing methods at speeds on the order of 75 words per minute. As new keys have been required, this traditional keyboard has been further enhanced using special keys like "Ctrl" and "Alt" whereby a different ASCII character from 'x' is perceived by the computer when 'Ctrl' and 'x' are pressed at the same time. Furthermore, full point-and-click menu systems have been invented for other special characters. Generally, speed and accuracy of typing using traditional methods decrease as key size and spacing are compressed. Thus, personal computer keyboards are relatively large and in many cases exceed the size of earlier typewriter keyboards typically due to added special purpose keys or splitting apart of keys depressed by the right and left hand fingers..

[0006] As technology has improved, miniaturized portable computers, cellular phones, instant messaging devices, pag-ers, personal digital assistants (PDAs), digital watches, calculators and other special purpose personal equipment have proliferated for performing traditional computing functions and for communicating over wired and wireless networks. One consequence of these advances is that such miniaturized portable devices have grown considerably smaller than the personal computer keyboards used to input data into them. Accordingly, alternative data entry systems have been devised to enable alphanumeric and data entry into these miniature devices.

[0007] In one approach, data entry is accomplished using highly miniaturized limited function keyboards having mechanical keys in a physical keyboard array or keys graphically displayed on a touch-screen associated with the device, and the user is required to compose text and enter data using a pointer to select a character. In other approaches, a limited number of hard or soft keys are provided, and shorthand messages can be composed by an encrypted means. Although these keyboards do enable text and data entry on these miniaturized devices, it is often tedious and impractical, either due to the physically small size of the keys compared to the user's fingers, or the inconvenience of having to use a pointer to press the keys.

[0008] The spatial limitations inhibiting usage of the traditional keyboard in such miniaturized equipment have prompted a number of other proposals to increase speed and accuracy of data entry, text composition, and the like, using a lesser number of keys. See for example, U.S. Pat. Nos. 4,737,980, 5,543,818, 5,790,115, 5,812,117, 5,982,351, 6,011,542, 6,021,312, 6,031,471, and 6,104,317, the teachings of which are hereby incorporated by reference in their entirety. In these approaches, the physical equipment is hardware and/or software modified to enable character selection by the user of displayed characters of full collection of characters or partial collection of characters employing a fewer number of keys than characters in the collection of characters.

[0009] Some of these approaches deal with the use of the available key set of the particular device, e.g., the 3×4 key standard telephone key pad (the '980 and '317 patents), video game controllers (the '818 patent), pagers (the '312 patent), television channel remote controllers (the '115 patent), and others. Some of these use a cursor moved by mouse or up-down and left-right cursor movement keys to scroll through displayed characters (the '117, '471, '351, '541 and '542 patents) or to scroll characters through a character position of a word (the '115 patent) to select the proper character when it is in the select position using a keystroke or mouse click or a stylus applied against the touch sensitive screen.

[0010] In one operating mode of the '542 patent, a circular character wheel is displayed on a graphical text entry screen or display, the user rotates the character wheel until a desired character in a particular collection of characters, e.g., the 26 letter alphabet, is in a selection window using a key of the device. The user selects the character using another key or keystroke, and the selected character is displayed in a text entry screen. Scrolling about the entire alphabet is slow and occupies a large part of the display. In another operating mode, only a portion of the full alphabet is depicted on a smaller portion of the display. The user then advances the character wheel to display the desired letter, and it is selected